Natural Hazards Research Australia

Call for Expressions of Interest

T9-A4: Improving the accuracy of the fire behaviour metric 'fireline intensity' for Australian fuels

Expressions of interest due **5pm AEST, 3 October 2025**
to research@naturalhazards.com.au

Australian Government

Overview

Natural Hazards Research Australia (hereafter the Centre) is seeking Expressions of Interest from project teams for the following project:

T9-A4: Improving the accuracy of the fire behaviour metric 'fireline intensity' for Australian fuels

Project description	The project aims to: **1. Review existing literature** Identify Australian fuel types and key species lacking known heat of combustion values and document current state of knowledge. **2. Conduct combustion experiments** a. Develop a standardised method for determining the rate and nature of heat release replicating real-word bush fire spread. b. Investigate key fuel types (including but not exclusively wet forest, dry forest, grass, heath and pine) under varying environmental conditions e.g. varying curing and different fine fuel moisture to determine the rate and nature of heat release. This will include collecting and analysing data on moisture of extinction, fireline intensity, ignitability, total heat release, combustion efficiency and the proportion of heat released in smouldering combustion. c. if possible, examine different strata from fuel types (e.g. surface, near-surface, elevated and canopy). **3. Improve Australian fuel heat release models** Make recommendations based on outputs from the combustion experiments that can be related to field-based observations leading to direct improvements to a range of fire and land management decision-making products. By increasing the accuracy of measures of fireline intensity, this will contribute to more consistent fire behaviour model outputs and hence fire danger ratings within the Australian Fire Danger Rating System (AFDRS) across different fuel types. Furthermore, this research will have implications relating to smoke, carbon release, fire impacts and fire research focusing on fire-atmosphere interactions.
Estimated duration	The duration of this project is three years
Budget	The budget envelope for this project is $500,000 to $750,000 (ex GST) The research team should note that this is a competitive process. Expression of Interest submissions will be assessed on value for money and justification for any funds requested.
Related national research priorities[1]	Understanding and mitigating risk Interoperability
Related Centre research priorities for 2024-26[2]	Evidence-informed policy, strategy and foresight

1 https://www.naturalhazards.com.au/sites/default/files/2022-05/NatHazResAus ResearchPriorities FA02.pdf

2 https://www.naturalhazards.com.au/sites/default/files/2024-07/NHRA%20ResearchPlan24%E2%80%9326%2004.pdf

Supporting organisations	This project was reviewed and prioritised by the Bushfire Predictive Services Technical Group (PSG). The PSG is the AFAC Group where the collaboration, development, and mutual investment across Jurisdictions occurs to improve the national capability in predictive services and bushfire intelligence. PSG provides strategic advice to the Rural and Land Management Group (RLMG) for the ongoing development of a predictive services decision support capability for national predictive service capability. The PSG includes jurisdictional representative from all States and Territories.
Centre contact	For any questions regarding this Call for EOIs, please email research@naturalhazards.com.au.
Online project briefing	For more information or questions, an online project briefing webinar will be held at **1:30pm AEST on 10 September 2025**
Submission of EOI	EOIs must be prepared using the Centre's EOI submission form and Budget Template. EOIs are to be submitted to research@naturalhazards.com.au by **5:00pm AEST on 3 October 2025**

Statement of Requirements

Background and context

The project was developed in response to concerns from the AFAC Predictive Services Group (PSG) regarding the reliability of 'heat of combustion' values used in the Australian Fire Danger Rating System (AFDRS). The PSG noted that some models relied on assumed values lacking strong support in the literature.

To address this, the AFDRS National Project Team conducted a review outlining the current definitions and available published values of heat of combustion. Recognising the critical role of accurate heat of combustion values in calculating fireline intensity—a key output of the AFDRS and bushfire simulators—the PSG emphasised the importance of using high-quality input data. Representing the majority of Australia's fire and land management agencies, the PSG acknowledged this project would significantly contribute to both the advancement of fire science, the AFDRS and fire behaviour predictions from simulators such as SPARK. This project concept was prepared by the AFDRS National Project Team in collaboration with the Country Fire Authority (CFA).

Project description

The project aims to:

1. Review existing literature:

Identify Australian fuel types and key species lacking known heat of combustion values and document current state of knowledge.

2. Conduct combustion experiments

a. Develop a standardised method for determining the rate and nature of heat release replicating real-word bushfire spread.
b. Investigate key fuel types (including but not exclusively wet forest, dry forest, grass, heath and pine) under varying environmental conditions e.g. varying curing and different fine fuel moisture to determine the rate and nature of heat release. This will include collecting and analysing data on moisture of extinction, fireline intensity, ignitability, total heat release, combustion efficiency and the proportion of heat released in smouldering combustion.
c. if possible, examine different strata from fuel types (e.g. surface, near-surface, elevated and canopy).

3. Improve Australian fuel heat release models

Make recommendations based on outputs from the combustion experiments that can be related to field-based observations leading to direct improvements to a range of fire and land management decision-making products. By increasing the accuracy of measures of fireline intensity, this will contribute to more consistent fire behaviour model outputs and hence fire danger ratings within the Australian Fire Danger Rating System (AFDRS) across different fuel types. Furthermore, this research will have implications relating to smoke, carbon release, fire impacts and fire research focusing on fire-atmosphere interactions.

Expected outputs

Outputs are the products that are expected to be delivered by this project.

The project is expected to deliver:

1. A comprehensive literature review

Identifying and describing the various fuel types present in Australia and determine key species and fuel types for which heat of combustion values are currently known and unknown. The findings will be presented in a detailed report, highlighting data gaps and recommending priorities for future research.

2. Combustion values

Indicative values for representative samples of the key fuel types from experimental work. Fuel types of interest includes grasslands, forest (dry and wet), pine, mallee, heathlands.

3. Predictive equations

For each fuel type models describing how moisture of extinction, fireline intensity, ignitability, total heat release, combustion efficiency and the proportion of heat released in smouldering combustion vary with:

- fuel moisture content
- curing
- other relevant fuel properties (fuel strata being burnt, fuel load, bulk density).

4. Guidelines, training material and recommendations

Guidelines for calculating realistic heat of combustion values for each AFDRS fuel type/ dominant species under various weather conditions. The outputs of this project are nationally relevant, supporting consistent and effective fire danger communication across Australia. The AFDRS National Team will work with the project team to develop short communications and fact sheets that can be distributed through AFAC and AFDRS websites and technical pages.

5. Project specific translation and utilisation

Liaison with AFDRS National Team and AFDRS Technical Working Group (consisting of jurisdictional representatives and subject matter experts to ensure outputs are integrated into existing systems. The AFDRS National Team and Bureau of Meteorology will support the integration of new values into the AFDRS calculation engine. The Predictive Service Research Working Group will support the dissemination of information to a wide range of stakeholders including Fire Predictive Services who oversee the development of SPARK.

Core outputs

- Final report – including values for a range of fuel types/dominant species, predictive models of heat of combustion under varying conditions and identification of future research opportunities
- Stakeholder presentation/s and liaison with AFDRS National Team and AFDRS Technical Working Group
- Academic publications in high-ranking international journals
- Please detail other innovative outputs that your team can deliver to address the outcomes below.

Additional outputs

- Project plan and plain language statement
- Quarterly progress reports
- Project evaluation report
- Relevant communication outputs including but not limited to presentations and posters.

Collaborative Approach

Researchers are expected to undertake the research using a collaborative approach to assist in the translation and transfer of knowledge to end-users and to ensure the project meets their needs. Researchers are encouraged to outline their approach to ensuring effective collaboration which could include embedding researchers within end-user organisations for a period of time.

Anticipated outcomes

This project will deliver significant benefits to both communities and the broader fire and emergency management sector through improved fire danger forecasting, better decision-making tools and enhanced community safety measures.

This project directly supports creating safer, more resilient and sustainable communities in the face of natural hazards by:

Enhancing community resilience

Improved fire danger information empowers individuals, households and communities to prepare and respond more effectively to bushfire threats, reducing potential harm and facilitating quicker recovery.

Strengthening sector capability

The project builds capacity within the emergency management sector through better tools, training and data integration, ensuring that decision-makers are equipped to face future challenges.

Fostering innovation and continuous improvement

By advancing fire behaviour science and enhancing operational forecasting systems, the project ensures that Australia's bushfire management approaches remain at the forefront of global best practice. Through these outcomes, the project will make a lasting contribution to reducing the impacts of bushfires on Australian communities while enhancing the capacity of the sector to manage fire risks sustainably and effectively.

Quality control and reporting

The project will be overseen and supported by a Project Management Committee (PMC) comprising the Principal Researcher, a Centre representative, and at least one stakeholder representative. Composition of the PMC will be determined in consultation with the Principal Researcher.

Reports

The Centre expects that the outputs delivered by this project will meet the highest scientific standards and will be suitable for publication on the Centre website and in industry newsletters, as well as in high-quality scientific journals.

The successful research organisation/s must co-develop with end-users a project plan and project summary using the Centre's templates. The project summary should explain in plain language what the project is about, what questions it intends to answer and describe the expected practical outputs that will make use of the research findings. The project plan must be approved by the PMC and will become an attachment to the contract.

Reports (and any supporting material) must be submitted to the PMC's satisfaction and will be subject to review by PMC members. The project team will be required to ensure an internal peer review process is undertaken prior to the final report being submitted.

Milestone reporting

The project team must report all milestone deliverables and engagement activities into the Centre's Project Management System. This will include sufficient justification for the completion of milestones to the satisfaction of the PMC and the Centre.

Communication

To further assist with quality assurance, it is expected that:

- regular PMC meetings will be held
- the project team will use a consultative approach, documented in quarterly reports
- the Principal Researcher will give periodic presentations to key stakeholder groups to gain critical feedback on project milestones.

Additional quality control processes may be agreed as part of the project planning process.

Contractual Arrangements

A copy of the Research Services Agreement, the proposed form of contract for the purposes of this project, can be found here

The Centre reserves its rights to make amendments to the form of contract.

This agreement should be reviewed by applicants as part of the EOI submission.

If you would like to request amendments to any of the terms and conditions set out in the proposed form of contract, details of the proposed changes and the reason the changes are requested must be included in the EOI submission form. Requests for any changes will be at the sole discretion of the Centre.

Selection as a shortlisted or preferred provider does not give rise to a contract (express or implied) between the shortlisted or preferred provider and the Centre for the supply of goods or services. No legal relationship will exist between the Centre and the shortlisted or preferred provider until such time as a binding contract in writing is executed by both parties.

In the case of consortiums, the Centre requests that one consortium member be nominated as Lead Research Provider and take responsibility for subcontracting other parties.

Submitting an expression of interest

Application and review process

The Centre will conduct an independent assessment process for the selection of a research provider to deliver the Research Project. An assessment panel will conduct evaluation of the EOIs that are received. Where required, the panel may conduct interviews, request presentation or referee checks as part of the assessment process.

Following the assessment process the Centre may appoint one or more successful Applicants on the Centre contract terms. Under the Centre contract, the preferred provider will co-develop a detailed Research Plan with input from key stakeholders.

Key dates

27 August 2025	Call for EOIs opens
10 Sept 2025	Online project briefing
3 October 2025	Due date for EOIs

Submission Requirements for this EOI

Project teams responding to this EOI are required to submit their response using the Centre's EOI submission form and Budget Template. Submissions must include:

- a statement of capability (max 600 words), including the proposed contributions of each research team member to the project.
- a statement (max 400 words) about the diversity of the project team
- a statement (max 400 words) about the project's inclusion and respect of First Nations peoples, philosophies, cultures, rights and/or knowledges
- an outline (max 1000 words) describing how the project team intends to approach the project, strategies for effective collaboration and an indicative methodology
- an indicative schedule of work and interim milestones/project outputs as described in this document
- a proposed project budget in line with the budget envelope provided, including details of any in kind contribution from research organisation/s – a detailed budget to be provided using the downloadable Budget Template provided on the Centre's website
- a clear statement (max 400 words) describing the outcomes that will be delivered for this project and how they will be used by stakeholders
- a clear statement (max 400 words) describing the outputs that the proposed approach to this project will deliver and how the findings could translate into practice
- a statement (max 500 words) demonstrating the project team's relevant industry and stakeholder engagement
- a risk management statement and confirmation if Ethics approval is required for the project (max 500 words)
- any requested changes to the Centre's proposed form of contract
- up to two-page CVs for each proposed project team member.

Additional information

Frequently asked questions

Additional information provided to individual respondents will also be published on the Centre's website to ensure access to all interested parties. Respondents are encouraged to check the website for any additional information via these published FAQs, prior to the closing date.

Online project briefing

An online webinar scheduled for **1:30pm AEST 10 September 2025** will provide a more detailed briefing of the project and the opportunity for interested parties to pose specific questions.

Registrations for this webinar can be made via the project page on the Centre's website. Once completed, a recording of this webinar will be posted to the website to ensure all interested respondents have access to this information.

Evaluation criteria

After the closing date, the Centre will review submitted EOIs against the evaluation criteria below. The evaluation criteria provide an indication of those matters that should be included in the EOI and supporting material – details are provided in the table below.

The Centre reserves the right not to offer the work, or only allocate a proportion of the available funding, if a proposal does not meet the Centre's needs. The Centre reserves the right to invite any other specific researchers as it sees fit to submit proposals before or after the closing date.

Mandatory evaluation criteria

- **Registered Australian Business**: The Respondent holds a valid Australian Business Number (ABN) or Australian Company Number (ACN)
- **Public Liability Insurance:** The respondent has or will obtain appropriate insurance
- **Specific research capability:** Demonstrated research expertise and/or experience in the field of fire science. Submissions to Expressions of Interest must clearly explain how this expertise addresses the project requirements outlined here.

Evaluation criteria	% weighting
Research capability: the capacity and capability to deliver an excellent research project in an Australian environment	25
Project approach: a demonstrated understanding of the project requirements and a proposed project approach and methodology that is appropriate, feasible and robust Relevant outline of a collaborative approach to assist in the translation and transfer of knowledge to end-users and to ensure the project meets their needs	20
Project outcomes and outputs: demonstrate a high-level understanding of the intentions of the project and how outputs/outcomes translate to practice	15
Industry engagement: strong track record of industry engagement with the ability to support and influence Australian disaster management at a national or state/territory level through interaction with key stakeholders	20
Value for money: value with money refers to an application representing an efficient, effective, economical and ethical use of Centre resources. Consideration of the relevant financial and non-financial costs and benefits of each application including, but not limited to: → the quality of the application and activities represented by the technical assessment → fitness for purpose of the application in contributing to Centre objectives → the potential Research Provider's relevant experience and performance history → whole of life costs (in-kind, other costs, risks, legal risks)	20